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Title:

Participatory simulation to test incentives for provisioning ecosystem services in agroforestry systems. Costa Rica

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Abstract

Numerous policy instruments have been proposed to promote provision of ecosystem services (ES) by agro-ecosystems. However the design of sound incentive schemes is still a challenge, partly because of the difficulty to adapt it to the particularities of agro-ecosystem and socio-economic conditions. To respond to this challenge, we developed and tested a new approach to explore the possible effects of policy instruments on farmers' adoption of practices leading to enhance the ES provision in coffee agroforestry systems. We applied this approach in a Costa Rican watershed, where coffee plantations provide ES but is also a source of disservices: nitrogen pollution of water resources and soil erosion. First, we conducted semi-structured interviews with 30 coffee producers to analyze the diversity of their production systems and response to existing policies. Second, we developed a specific role playing game (RPG) to simulate the effects of various instruments: an enforcement of the law prohibiting coffee production on water line, Payment for Environmental Services (PES) for adoption of highly shaded coffee and protection of water line ; green credits for a reduce use of inputs and plots arrangement with terraces. We found that existing instruments are currently not effective in the region but farmers would be responsive to some of the new incentives. Simulations showed that PES and green credits are the most effective incentives to reduce environmental impacts without decreasing coffee production while an increased enforcement of the law impacts negatively coffee production. Furthermore the effects of the incentives tested in the RPG depended on socio-economic criteria related to producers' household. We finally discuss the technical and financial feasibility of the implementation of these incentives. After discussing the possible limits of our RPG method, we argue that it facilitates the co-design of sound incentives to overcome the challenges of multiple ES provision in agro-ecosystems.